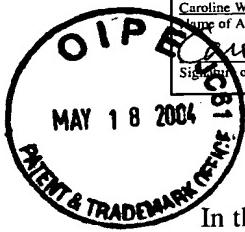


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Caroline Wei-Berk Name of Attorney	45,203 Registration No.
<u>Caroline Wei-Berk</u> Signature of Attorney	



P&G Case 8391

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of

Ehrnsperger et al.
Serial No. 09/849,554
Filed May 4, 2001

: Confirmation No. 1139
: Group Art Unit 1724
: Examiner Evars C. Cintins

For Use of Absorbent Materials to Separate Water from Lipophilic Fluid

BRIEF ON APPEAL

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Enclosed, pursuant to 37 C.F.R. 1.192(a), is Appellant's brief on Appeal for the above application. The Brief is being forwarded in triplicate.

The fee for this Brief on Appeal is \$330.00 37 CFR 1.17(c).

The Director is hereby authorized to charge the above fee, or any additional fees that may be required, or credit any overpayment to Deposit Account No. 16-2480 in the name of The Procter & Gamble Company. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

By Caroline Wei-Berk
Caroline Wei-Berk
Attorney or Agent for Applicant(s)
Registration No. 45,203
(513) 627-0352

Date: May 13, 2004

Customer No. 27752

(BriefonAppealTrans.doc)
(Last Revised 3/30/2004)



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CAROLINE WEI-BERK 45,203
Name of Attorney/Agent Registration No.
Caroline Wei Berk
Signature of Attorney/Agent

Case 8391

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In the Application of :
Ehrnsperger et al. : Confirmation No. 1139
Serial No. 09/849,554 : Group Art Unit 1724
Filed May 4, 2001 : Examiner Ivars C. Cintins
For USE OF ABSORBENT
MATERIALS TO SEPARATE
WATER FROM LIOPHILIC
FLUID

APPEAL BRIEF

Commissioner for Patents
Mail Stop Appeal Brief -Patents
P.O.Box 1450
Alexandria, VA 22313-1450

Dear Sir,

This is Applicants' Brief relating to an appeal from the November 19, 2003, Final Rejection in the above-identified application. The Notice of Appeal was mailed on March 11, 2004 and was noted as received by the USPTO on March 15, 2004. This Appellant's Brief is being filed in triplicate.

I. REAL PARTY IN INTEREST

The real party in interest is Procter & Gamble Company of Cincinnati, Ohio, by virtue of the Assignment recorded on August 3, 2001, at Reel 012042, Frame 0410.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to the Appellant, or known to Appellant's undersigned legal representative, that will directly affect the Board's decision in the present appeal.

III. STATUS OF CLAIMS

Claims 31-51 are pending and have been appealed in the Notice of Appeal mailed on March 11, 2004. Appellants' hereby withdraw Claims 47-51 from Appeal. A complete copy of the appealed claims 31-46 is set forth in the Appendix.

IV. STATUS OF AMENDMENTS

All amendments presented in the case have been entered.

V. SUMMARY OF INVENTION

The present invention provides a cost effective, efficient and safe process for non-aqueous cleaning (i.e., dry cleaning) of fabrics.

The present invention relates to a process for treating fabrics comprising the steps of: exposing fabrics to a lipophilic fluid and water; recovering from the fabrics an emulsion comprising said lipophilic fluid and said water; and exposing said emulsion to an absorbent material to remove water from the lipophilic fluid and emulsion such that lipophilic fluid can be recovered (page 3, lines 5-11).

VI. ISSUE

Whether Claims 31-46 are unobvious and patentable over U.S. Patent 3,733,267 (Haase) in view of French Patent 2,268,898; further in view of U.S. Patent 4,685,930 (Kasprzak), U.S. Patent 5,057,240 (Madore et al.) or U.S. Patent 6,368,359 (Perry et al.); still further in view of U. S. patent 4,747,960 (Freeman et al.)?

VII. GROUPING OF CLAIMS

Claims 31-46 stand or fall together.

VIII. ARGUMENTS

Whether Claims 31-46 are unobvious and patentable over U.S. Patent 3,733,267 (Haase) in view of French Patent 2,268,898; further in view of U.S. Patent 4,685,930 (Kasprzak), U.S. Patent 5,057,240 (Madore et al.) or U.S. Patent 6,368,359 (Perry et al.); still further in view of U. S. patent 4,747,960 (Freeman et al.)?

A. Examiner's Position

Claims 31, 32, 34-38, 40-48, 50 and 51 are rejected under 35 USC 103(a) as being unpatentable over U.S. Patent 3,733,267 (Haase) in view of French Patent 2,268,898; further in view of U.S. Patent 4,685,930 (Kasprzak), U.S. Patent 5,057,240 (Madore et al.) or U.S. Patent 6,368,359 (Perry et al.); still further in view of U. S. patent 4,747,960 (Freeman et al.). The Examiner states that Haase discloses contacting a dry cleaning fluid with a fabric, and thereafter purifying this fluid for reuse. The Examiner acknowledges that the primary reference does not disclose the specific type of dry cleaning fluid or the particular water absorbent material employed in Appellants' invention. However, the Examiner presents the following modifications to the primary reference to support the rejection:

(a) The French '898 Patent teaches dry cleaning textile articles made of synthetic fibers with a fluid comprising surfactants in an organic solvent and an aqueous detergent in an emulsified form; therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the dry cleaning fluid disclosed in the French '898 Patent as the dry cleaning fluid of Hasse, in order to obtain the ability to clean textile made from synthetic fibers for the process of the primary reference.

(b) Kasprzak, Madore et al. and Perry et al. each discloses the recited lipophilic fluids (such as decamethylcyclopentasiloxane) as known detergent component for cleaning textiles (see line 4 of Kasprzak Abstract; line 12 of Madore et al. Abstract; and Col. 1, line 62 of Perry et al.); therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to substitute the detergent of Kasprzak, Madore et al. or Perry et al. for the detergent in the dry cleaning fluid of the modified primary reference (i.e., Hasse/French patent combination).

(c) Freeman et al. teaches removing water from a fluid with an absorbent material comprising a porous nonwoven sheet impregnated with a cross-linked polyacrylate (col. 2, lin 18 and col. 3, line 4); therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the recited amount of sorbent material (claims 32 and 34) in the composition of the modified primary reference in order to ensure that the fluid undergoing treatment in this modified primary reference is adequately purified; it would also have been obvious to a person of ordinary skill in the art at the time the invention was made to treat a fluid having a temperature within the recited range (claim 40) by the process of the modified primary reference, since the recited temperature range encompasses normal room temperature.

B. Appellants' Position

Appellants' respectfully traverse the above rejection.

- (a) Hasse teaches filtration of a dry cleaning fluid mixture using adsorbent materials, such as clay, carbon. The dry cleaning fluids disclosed by Hasse are the conventional chlorinated dry cleaning solvents, such as perchloroethylene (See Hasse, col. 8, line 3; col. 9, lines 2-3). French '898 Patent discloses a fabric cleaning process using a mixture that provides both dry and wet cleaning benefit. The solvents useful for the dry cleaning aspect are also the conventional chlorinated dry cleaning solvents, such as perchloroethylene and 1,1,1-trichloroethane.

The cited references provide no teaching or suggestion of a process involving dry cleaning solvent or mixtures comprising Appellants' lipophilic fluids, which are clearly distinguishable from conventional chlorinated dry cleaning solvents.

Furthermore, it is well known that absorption involves penetration of one substance into the inner structure of another, whereas adsorption involves one substance being attracted to and held on the surface of another. Because of this fundamental difference, adsorbent materials employed in the present invention and adsorbent materials (e.g., clay, carbon) employed in the cited references (Hasse, col.1, line 16) function differently and are not equivalent.

As the Examiner has correctly stated that the primary reference does not disclose the specific type of dry cleaning fluid or the particular water absorbent material employed in Appellants' invention, Appellants further submit that the processes of the modified primary reference (Hasse/French '898 Patent) employing adsorbent materials in a mixture comprising chlorinated solvent and water in no way teach or suggest a process employing adsorbent materials to remove water from specific type of lipophilic fluids, which are distinguishable from conventional chlorinated dry cleaning solvents.

Since Hasse/French '898 Patent do not teach or suggest Appellants' fabric treating process employing specific type of lipophilic fluids and water to form a fabric treatment mixture and adsorbent materials for removal of water from the mixture, Claims 31-46 are unobvious and patentable over Hasse/French '898 Patent under 35 USC 103(a).

- (b) Kasprzak and Perry et al. disclose dry cleaning processes using siloxane type fluids and/or mixtures. Madore et al. discloses liquid detergent composition comprising silicone fabric softening agent and its use in a conventional aqueous wash/rinse process (col. 7, lines 30-32).

As stated above, adsorbent materials disclosed by the references function differently and are not equivalent to the adsorbent materials of the present invention. Thus, even if, as suggested by the Examiner, the dry cleaning fluid mixtures of the modified primary reference (Hasse/French '898 patent) were substituted with the siloxane type fluids/mixtures of Kasprzak or Perry et al., or the liquid detergent

of Madore et al., the combined references still fail to teach or suggest the present process involving the use of absorbent materials to remove water from specific type of lipophilic fluid/water mixtures.

Since the combined references do not teach or suggest the present process employing absorbent materials for removal of water from mixtures comprising specific type of lipophilic fluid and water, Claims 31-46 are unobvious and patentable over Hasse/French '898 Patent, further in view of Kasprzak, Perry et al., or Madore et al., under 35 USC 103(a).

(c) Freeman is directed to water absorbent packet suitable for use in applications such as under sea seismic oil and gas explorations, fuels or engine oils, and dielectric fluids for electrical equipment (col. 1, lines 12-45). Freeman also discloses super water absorbent materials, including crosslinked polyacrylate and cellulose derivatives, for use in personal and hygiene products, such as diapers, sanitary napkins, paper towels and wipes (col. 1, line 65-col. 2, line20).

Prior art is analogous if and only if: (1) the art is in the same field of endeavor, or (2) the art is reasonably pertinent to the particular problem the invention solves. *See In re Clay*, 966 F.2d 656, 659, 23 USPQ2d 1058, 1060 (Fed. Cir. 1992). A reference is reasonably pertinent if it logically would have commended an inventor's attention in considering his problem. *Id.*

Appellants submit that Freeman is directed to non-analogous art. First, Freeman's disclosures of fuels, engine oils, other industrial applications or personal hygiene product applications are not in the same field of endeavor as Appellants' invention, which relates to the fabric cleaning/laundry applications. Second, Freeman's disclosure is not reasonably pertinent to the problem the present invention addresses, namely, a fabric cleaning process involving treating fabrics with a lipophilic fluid and water and removing water from the lipophilic fluid. To a person of ordinary skill in the laundry or fabric cleaning art, Freeman's fuels, engine oils or other industrial fluids are not the type of fluid to be used as cleaning fluids. When the skilled artisan is faced with the problem of separating and recovering the cleaning fluids, such as lipophilic fluids, Freeman's handling of fuels, engine oils or industrial oils is not likely to catch the attention of the artisan. As to the type of personal hygiene product application disclosed by Freeman, such disclosure is likely to catch the attention of an artisan dealing with an absorbency problem, not with a separation problem,

Moreover, it is hindsight reasoning when prior art references are combined without evidence of a suggestion, teaching, or motivation and the inventor's disclosure is taken as the roadmap for piecing together the prior art references to defeat patentability. *See e.g., Ruiz v. A. B. Chance Co.*, 357 F.3d 1270, 1275 (Fed. Cir. 2004); *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999).

Since Freeman fails to relate to any aspect of a fabric treatment process, no motivation can be found in the references to combine Freeman with other cited references. Further, a person of ordinary skill

in the art, looking to solve the problem relating to fabric treatment processes, more specifically the step of recovering lipophilic fluids from a fabric treatment emulsion, would not have been motivated to consult the teaching of Freeman.

Based on the foregoing, Appellants submit that this rejection relies on improper hindsight in combining Freeman with other references relating fabric treatment processes. Therefore, this rejection is erroneous and should be reversed.

C. Examiner's Position

Claim 33 and 49 are rejected under 35 USC 103(a) as being unpatentable over Hasse, the French patent, Kasprzak, Madore et al. and Freeman et al. as applied above, further in view of US 4,309,247 (Hou et al.). The Examiner acknowledges that the modified primary reference does not disclose the recited spacer material. However, the Examiner states that it would have been obvious to combine Hou's filter sheet comprising clay, activated carbon, polystyrene and/or polyethylene (col. 5, lines 15, 16, 19) with the modified primary reference to provide additional filtration capability for the filter.

Claim 39 is rejected under 35 USC 103(a) as being unpatentable Hasse, the French patent, Kasprzak, Madore et al. and Freeman et al. as applied above, further in view of US 3,441,501 (Segall et al.) The Examiner acknowledges that the modified primary reference does not disclose the recited regeneration (i.e., the triggering water release) step. However, the Examiner states that it would have been obvious to combine the regeneration of water absorbent material as disclosed by Segall et al. (col.2, last line to col. 3, line 2) with the modified primary reference.

D. Appellants'Position

First, Appellants' respectfully traverse the combination of Freeman with other references which is improper for the reasons stated above in Section B.

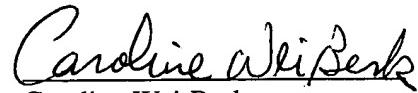
Second, Claims 33 and 39 are dependent claims that include all the limitations of the independent claim 31. As Appellants stated above, Claim 31 is unobvious and patentable over the cited references because the combined references do not teach or suggest the present process employing absorbent materials for removal of water from mixtures comprising specific type of lipophilic fluid and water.

The disclosure of Hou or Segall does not supplement the deficiency in the disclosure of absorbent materials or provide motivation to combine the Freeman reference, therefore, Claims 33 and 39 are unobvious and patentable over Hasse/French '898 Patent, in view of Kasprzak, Perry et al., or Madore et al., or further in view of Freeman, under 35 USC 103(a).

IX. SUMMARY

In view of the foregoing remarks, Appellants respectfully submit that the rejections of Claims 31-46 under 35 USC 103(a) are erroneous and reversal by the Board is requested.

Respectfully submitted,


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Reg. No. 45,203
(513) 627-0352

May 13, 2004
Customer No. 27752

APPENDIX

31. A process for treating a fabric comprising the steps of:

- a. exposing a fabric to a lipophilic fluid and water, said lipophilic fluid being selected from the group consisting of linear or cyclic siloxanes, perfluorinated amines, C6 or higher diols, polyol esters, and mixtures thereof;
- b. recovering said lipophilic fluid and said water in the form of a lipophilic fluid and water emulsion from said fabric;
- c. exposing said lipophilic fluid and water emulsion to an absorbent matrix comprising an absorbent material comprising a polymer selected from the group consisting of surface cross-linked polyacrylate, surface cross-linked polyacrylamide and mixtures thereof, in order to effect the removal of said water from said lipophilic fluid and water emulsion such that the lipophilic fluid is recovered as collected lipophilic fluid.

32. A process according to Claim 31 wherein said absorbent matrix comprises a spacer material in an amount from at least about 1% to at most about 50% by volume of the dry bulk matrix and is selected from the group consisting of sand, silica, aluminosilicates, glass microspheres, clay, layered silicates, wood, natural textile materials, synthetic textile materials, alumina, aluminum oxide, aluminum silicate, zinc oxide, molecular sieves, zeolites, activated carbon, diatomaceous earth, hydrated silica, mica, microcrystalline cellulose, montmorillonite, peach pit powder, pecan shell powder, talc, tin oxide, titanium dioxide, walnut shell powder, particles of different metals or metal alloys and mixtures thereof.

33. A process according to Claim 32 wherein said spacer material is selected from the group consisting of particles made from polybutylene, polyethylene, polyisobutylene, polymethylstyrene, polypropylene, polystyrene, polyurethane, nylon, polytetrafluoroethylene and mixtures thereof.

34. A process according to Claim 31 wherein said absorbent material comprises a high surface area material in an amount from at least about 1% to at most about 50% by volume of the dry bulk matrix.

35. A process according to Claim 31 wherein said absorbent material has a morphology selected from the group consisting of fibrous morphology, particulate morphology and mixtures thereof.

36. A process according to Claim 31 wherein said absorbent matrix is in a form selected from the group consisting of a porous woven sheet impregnated with absorbent materials, a film, a membrane and mixtures thereof.

37. A process according to Claim 31 further comprising the step of passing said lipophilic fluid and water emulsion through a particulate matter filter such that particles and particle aggregates about 1 micron or larger are removed.

38. A process according to Claim 31 further comprising the step of exposing said lipophilic fluid and water emulsion to activated carbon.

39. A process according to Claim 31 further comprising the step of triggering said absorbent material to release said removed water by exposing said absorbent material to a trigger mechanism selected from the group consisting of light, pH, temperature, sound, electric field, pressure, ionic strength, vibration and mixtures thereof.

40. A process according to Claim 31 wherein the temperature of said lipophilic fluid and water emulsion is at least about 10°C and at most about 50°C prior to exposing said emulsion to said absorbent material.

41. A process according to Claim 31 further comprising the step of exposing said collected lipophilic fluid to activated carbon.
42. A process according to Claim 31 further comprising the step of exposing said removed water to activated carbon.
43. A process according to Claim 31 wherein said lipophilic fluid and water emulsion comprises up to about 10% emulsifier by weight of the emulsion.
44. A process according to Claim 31 wherein said lipophilic fluid comprises a linear siloxane and/or a cyclic siloxane.
45. A process according to Claim 31 wherein said lipophilic fluid comprises decamethylcyclopentasiloxane.
46. A process according to Claim 31 wherein said lipophilic fluid and water emulsion also comprises adjunct ingredients selected from the group consisting of enzymes, bleaches, surfactants, fabric softeners, perfumes, antibacterial agents, antistatic agents, brighteners, dye fixatives, dye abrasion inhibitors, anti-croking agents, wrinkle reduction agents, wrinkle resistance agents, soil release polymers, sunscreen agents, anti-fade agents, builders, sudsing agents, composition malodor control agents, composition coloring agents, pH buffers, waterproofing agents, soil repellency agents and mixtures thereof.

LIST OF AUTHORITIES

In re Clay, 966 F.2d 656, 23 USPQ2d 1058 (Fed. Cir. 1992)

Ruiz v. A. B. Chance Co., 357 F.3d 1270 (Fed. Cir. 2004)

In re Dembicczak, 175 F.3d 994 (Fed. Cir. 1999)

IN RE CARL D. CLAY

91-1402

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

966 F.2d 656; 1992 U.S. App. LEXIS 13091; 23 U.S.P.Q.2D (BNA) 1058

June 10, 1992, Decided

PRIOR HISTORY: [**1]Appealed from: U.S. Patent and Trademark Office Board of Patent Appeals and Interferences

DISPOSITION: REVERSED.

LexisNexis (TM) HEADNOTES - Core Concepts:

COUNSEL: Jack E. Ebel, Marathon Oil Company, of Littleton, Colorado, argued for appellant. With him on the brief was Paul T. Meiklejohn, Seed & Berry, of Seattle, Washington, of counsel.

Teddy S. Gron, Associate Solicitor, Office of The Solicitor, of Arlington, Virginia, argued for appellee. With him on the brief was Fred E. McKelvey, Solicitor. Of counsel was Richard E. Schafer.

JUDGES: Before PLAGER, LOURIE, and CLEVENGER, Circuit Judges.

OPINIONBY: LOURIE

OPINION: [*657]

LOURIE, Circuit Judge.

Carl D. Clay appeals the decision of the United States Patent and Trademark Office, Board of Patent Appeals and Interferences, Appeal No. 90-2262, affirming the rejection of claims 1-11 and 13 as being unpatentable under 35 U.S.C. § 103. These are all the remaining claims in application Serial No. 245,083, filed April 28, 1987, entitled "Storage of a Refined Liquid Hydrocarbon Product." We reverse.

BACKGROUND

Clay's invention, assigned to Marathon Oil Company, is a process for storing refined liquid hydrocarbon product in a storage tank having a dead volume between the tank bottom and its outlet port. The process involves preparing a [**2] gelation solution which gels after it is placed in the tank's dead volume; the gel can easily be removed by adding to the tank a gel-degrading agent such as hydrogen peroxide. Claims 1, 8, and 11 are illustrative of the claims on appeal:

1. A process for storing a refined liquid hydrocarbon product in a storage tank having a dead volume between the bottom of said tank and an outlet port in said tank, said process comprising:

preparing a gelation solution comprising an aqueous liquid solvent, an acrylamide polymer and a crosslinking agent containing a polyvalent metal cation selected from the group consisting of aluminum, chromium and mixtures thereof, said gelation solution capable of forming a rigid crosslinked polymer gel which is [*658] substantially insoluble and inert in said refined liquid hydrocarbon product;

placing said solution in said dead volume;

gelling said solution substantially to completion in said dead volume to produce said rigid gel which substantially fills said dead volume; and

storing said refined liquid hydrocarbon product in said storage tank in contact with said gel without substantially contaminating said product with said gel and without substantially degrading [**3] said gel.

8. The process of claim 1 further comprising removing said rigid gel from said dead volume by contacting said gel with a chemical agent which substantially degrades said gel to a flowing solution.

966 F.2d 656, *; 1992 U.S. App. LEXIS 13091, **;
23 U.S.P.Q.2D (BNA) 1058

11. The process of claim 1 wherein said gelation solution further comprises an aqueous liquid contaminant present in said dead volume which dissolves in said solution when said solution is placed in said dead volume.

Two prior art references were applied against the claims on appeal. They were U.S. Patent 4,664,294 (Hetherington), which discloses an apparatus for displacing dead space liquid using impervious bladders, or large bags, formed with flexible membranes; and U.S. Patent 4,683,949 (Sydansk), also assigned to Clay's assignee, Marathon Oil Company, which discloses a process for reducing the permeability of hydrocarbon-bearing formations and thus improving oil production, using a gel similar to that in Clay's invention.

The Board agreed with the examiner that, although neither reference alone describes Clay's invention, Hetherington and Sydansk combined support a conclusion of obviousness. It held that one skilled in the art would glean from Hetherington that Clay's invention [**4] "was appreciated in the prior art and solutions to that problem generally involved filling the dead space with something." Opinion at 3 (emphasis in original).

The Board also held that Sydansk would have provided one skilled in the art with information that a gelation system would have been impervious to hydrocarbons once the system gelled. The Board combined the references, finding that the "cavities" filled by Sydansk are sufficiently similar to the "volume or void space" being filled by Hetherington for one of ordinary skill to have recognized the applicability of the gel to Hetherington.

DISCUSSION

The issue presented in this appeal is whether the Board's conclusion was correct that Clay's invention would have been obvious from the combined teachings of Hetherington and Sydansk. Although this conclusion is one of law, such determinations are made against a background of several factual inquiries, one of which is the scope and content of the prior art. *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966).

A prerequisite to making this finding is determining what is "prior art," in order to consider whether "the differences between [**5] the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. § 103. Although § 103 does not, by its terms, define the "art to which [the] subject matter [sought to be patented] pertains," this determination is frequently couched in terms of whether the art is analogous or not, i.e., whether the art is "too remote to be

treated as prior art." *In re Sovish*, 769 F.2d 738, 741, 226 USPQ 771, 773 (Fed. Cir. 1985).

Clay argues that the claims at issue were improperly rejected over Hetherington and Sydansk, because Sydansk is nonanalogous art. Whether a reference in the prior art is "analogous" is a fact question. *Panduit Corp. v. Dennison Mfg.*, 810 F.2d 1561, 1568 n.9, 1 USPQ2d 1593, 1597 n.9 (Fed. Cir.), cert. denied, 481 U.S. 1052 (1987). Thus, we review the Board's decision on this point under the clearly erroneous standard.

Two criteria have evolved for determining whether prior art is analogous: (1) [*659] whether the art is from the same field [**6] of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. *In re Deminski*, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986); *In re Wood*, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979).

The Board found Sydansk to be within the field of Clay's endeavor because, as the Examiner stated, "one of ordinary skill in the art would certainly glean from [Sydansk] that the rigid gel as taught therein would have a number of applications within the manipulation of the storage and processing of hydrocarbon liquids . . . [and that] the gel as taught in Sydansk would be expected to function in a similar manner as the bladders in the Hetherington patent." These findings are clearly erroneous.

The PTO argues that Sydansk and Clay's inventions are part of a common endeavor -- "maximizing withdrawal of petroleum stored in petroleum reservoirs." However, Sydansk cannot be considered to be within Clay's field of endeavor merely because both relate to the [**7] petroleum industry. Sydansk teaches the use of a gel in unconfined and irregular volumes within generally underground natural oil-bearing formations to channel flow in a desired direction; Clay teaches the introduction of gel to the confined dead volume of a man-made storage tank. The Sydansk process operates in extreme conditions, with petroleum formation temperatures as high as 115degreeC and at significant well bore pressures; Clay's process apparently operates at ambient temperature and atmospheric pressure. Clay's field of endeavor is the storage of refined liquid hydrocarbons. The field of endeavor of Sydansk's invention, on the other hand, is the extraction of crude petroleum. The Board clearly erred in considering Sydansk to be within the same field of endeavor as Clay's.

Even though the art disclosed in Sydansk is not within Clay's field of endeavor, the reference may still properly be combined with Hetherington if it is

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23 U.S.P.Q.2D (BNA) 1058

reasonably pertinent to the problem Clay attempts to solve. *In re Wood*, 599 F.2d at 1036, 202 USPQ at 174. A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's [**8] endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem. Thus, the purposes of both the invention and the prior art are important in determining whether the reference is reasonably pertinent to the problem the invention attempts to solve. If a reference disclosure has the same purpose as the claimed invention, the reference relates to the same problem, and that fact supports use of that reference in an obviousness rejection. An inventor may well have been motivated to consider the reference when making his invention. If it is directed to a different purpose, the inventor would accordingly have had less motivation or occasion to consider it.

Sydansk's gel treatment of underground formations functions to fill anomalies n1 so as to improve flow profiles and sweep efficiencies of injection and production fluids through a formation, while Clay's gel functions to displace liquid product from the dead volume of a storage tank. Sydansk is concerned with plugging formation anomalies so that fluid is subsequently diverted by the gel into the formation matrix, thereby forcing bypassed [**9] oil contained in the matrix toward a production well. Sydansk is faced with the problem of recovering oil from rock, i.e., from a matrix which is porous, permeable sedimentary rock of a subterranean formation where water has channeled through formation anomalies and bypassed oil present in the matrix. Such a problem is not reasonably pertinent to the particular problem with which Clay was involved -- preventing loss of stored [*660] product to tank dead

volume while preventing contamination of such product. Moreover, the subterranean formation of Sydansk is not structurally similar to, does not operate under the same temperature and pressure as, and does not function like Clay's storage tanks. See *In re Ellis*, 476 F.2d 1370, 1372, 177 USPQ 526, 527 (CCPA 1973) ("the similarities and differences in structure and function of the invention disclosed in the references . . . carry far greater weight [in determining analogy]").

n1 Sydansk refers to an anomaly, one of two general region types in an oil-bearing geological formation, as "a volume or void space [e.g., 'streaks, fractures, fracture networks, vugs, solution channels, caverns, washouts, cavities, etc.'] in the formation having very high permeability relative to the matrix [the other region type, consisting of homogeneous porous rock]."

[**10]

A person having ordinary skill in the art would not reasonably have expected to solve the problem of dead volume in tanks for storing refined petroleum by considering a reference dealing with plugging underground formation anomalies. The Board's finding to the contrary is clearly erroneous. Since Sydansk is non-analogous art, the rejection over Hetherington in view of Sydansk cannot be sustained.

CONCLUSION

For the foregoing reasons, the decision of the Board is REVERSED.

U.S. COURT OF APPEALS FOR THE FEDERAL CIRCUIT

RICHARD RUIZ and FOUNDATION ANCHORING SYSTEMS, INC., Plaintiffs-Appellees, v. A.B. CHANCE COMPANY, Defendant-Appellant.

03-1333

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

357 F.3d 1270; 2004 U.S. App. LEXIS 1325; 69 U.S.P.Q.2D (BNA) 1686

January 29, 2004, Decided

PRIOR HISTORY: [**1]Appealed from: United States District Court for the Eastern District of Missouri. Judge Catherine D. Perry. *Ruiz v. A.B. Chance Co.*, 2003 U.S. Dist. LEXIS 24044 (E.D. Mo., Mar. 10, 2003)

DISPOSITION: Affirmed.

CASE SUMMARY:

PROCEDURAL POSTURE: Appellee patent infringer sought a declaratory judgment against appellant patent holder that its system did not infringe the holder's patents. On appeal from a judgment in favor of the infringer, the case was remanded for a further examination of obviousness. On remand, the United States District Court for the Eastern District of Missouri again found the relevant claims invalid as obvious under 35 U.S.C.S. § 103. The holder sought review.

OVERVIEW: The holder obtained a patent for a screw anchor system for use in supporting and stabilizing slumping structures. The infringer marketed an underpinning system with screw anchors and metal brackets that used components from other manufacturers besides the holder. On remand, the district court held the relevant claims invalid as obvious based upon a finding of motivation to combine the teachings of prior art. On appeal, the court affirmed, holding that there was no clear error in the district court's factual determinations concerning the motivation to combine the prior art and the merit of the holder's asserted secondary considerations. Section 103 required consideration of the claimed invention as a whole and a showing of motivation to make the new combination. The district court did not utilize hindsight in its obviousness analysis,

but properly found a motivation to combine. It also properly discounted the holder's evidence of secondary considerations. The record showed that the holder's commercial success was not due to its unique combination, but to its experience and the fact that it was the first large screw anchor manufacturer to enter the underpinning market.

OUTCOME: The court affirmed the district court's judgment.

LexisNexis (TM) HEADNOTES - Core Concepts:

Patent Law > Nonobviousness > Tests & Proof of Obviousness

[HN1] See 35 U.S.C.S. § 103(a).

Patent Law > Nonobviousness > Tests & Proof of Obviousness

[HN2] In making the assessment of differences, 35 U.S.C.S. § 103 specifically requires consideration of the claimed invention "as a whole." Inventions typically are new combinations of existing principles or features. The "as a whole" instruction in Title 35 prevents evaluation of the invention part by part.

Patent Law > Nonobviousness > Tests & Proof of Obviousness

[HN3] Further assurance of an "as a whole" assessment of an invention under 35 U.S.C.S. § 103 occurs by requiring a showing that an artisan of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would select the various elements from the prior art and combine them in the claimed

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manner. In other words, the examiner or court must show some suggestion or motivation, before the invention itself, to make the new combination.

Patent Law > Nonobviousness > Tests & Proof of Obviousness
Patent Law > Jurisdiction & Review > Standards of Review

[HN4] While the ultimate determination of obviousness is a legal conclusion reviewed by an appellate court without deference, that determination always entails various factual findings that an appellate court reviews for clear error following a bench trial. The clear error standard permits reversal only when this court is left with a "definite and firm conviction" that the district court was in error.

Patent Law > Nonobviousness > Tests & Proof of Obviousness

[HN5] A court or examiner may find a motivation to combine prior art references in the nature of the problem to be solved.

COUNSEL: Matthew A. Rosenberg, Blumenfeld, Kaplan & Sandweiss, P.C., of St. Louis, Missouri, argued for plaintiffs-appellees.

John H. Quinn III, Armstrong Teasdale LLP, of St. Louis, Missouri, argued for defendant-appellant. With him on the brief was Andrew B. Mayfield.

JUDGES: Before NEWMAN, MICHEL, and RADER, Circuit Judges.

OPINIONBY: RADER

OPINION: [*1271] RADER, Circuit Judge.

On remand from this court's decision in *Ruiz v. A.B. Chance Company*, 234 F.3d 654 (Fed. Cir. 2000), the United States District Court for the Eastern District of Missouri found defendant-appellant A.B. Chance Company's (Chance) patented underpinning system obvious under 35 U.S.C. § 103. Because the district court made no clear error in its factual determinations concerning the motivation to combine the prior art teachings and the merit [*1272] of Chance's asserted secondary considerations, this court affirms.

I.

Since about 1970, Chance has manufactured screw anchors, also called helical piers, for use in supporting and stabilizing electrical transmission towers. Screw [*2] anchors are elongated shafts with an earth-boring (screw) tip and a transversely extending load-bearing member. In 1988, Chance extended its expertise in stabilizing slumping structures into the residential and

commercial building markets. Chance used screw anchors with a metal bracket to underpin these building foundations. The Chance underpinning method places the screw anchor adjacent to the footing and rotates the screw anchor to bore beneath the footing. When resistance to rotation of the screw anchor reaches a specified point, Chance attaches a metal bracket (designated as 30 in the Figure below) to the slouching foundation to transfer the building load onto the screw anchor. The United States Patent and Trademark Office issued U.S. Patent Nos. 5,139,368 and 5,171,107 to Chance in 1992 covering this screw anchor system. Figure 5 in the '107 patent shows the technology:

GET DRAWING SHEET 1 OF 5

Appellees Richard Ruiz and his company Foundation Anchoring Systems, Inc. (collectively "Ruiz") became distributors for Chance's underpinning system. During the early 1990s, Ruiz also formed various other anchoring companies and marketed systems that competed with the Chance system. [**3] In February 1997, Chance terminated Ruiz's distributorship. Thereafter, Ruiz began marketing an underpinning [*1273] system with screw anchors and metal brackets. This new system used components from other manufacturers. Ruiz filed suit against Chance in August of that same year alleging various non-patent claims, including discrimination, breach of contract, tortious interference with contract and business relations, and breach of fiduciary duty of good faith and fair dealing. Ruiz also filed for a declaratory judgment that its new underpinning system does not infringe Chance's patents and that the patents are invalid. Chance filed a counterclaim for patent infringement.

The validity question focuses on several prior art references. During the late 1980s, Richard Fuller and Stan Rupiper used screw anchors for underpinning existing structural foundations. Fuller and Rupiper used a concrete haunch, not a metal bracket, to transfer the load of the foundation to the screw anchor (the "Fuller-Rupiper method"). Gregory's U.S. Patent Nos. 4,911,580 and 4,765,777 claim an apparatus and system for underpinning structural foundations using a push pier and a metal bracket. In the Gregory system, the [**4] metal bracket transfers the foundation load to the push pier, which is driven into the ground to supply the necessary foundational support. The push pier relies on soil friction to supply that support. Figure 6 of the '580 patent shows this technology:

[SEE FIG. 6 IN ORIGINAL]

The scope of the claims in this case is not at issue in this appeal, because the parties agree that the claims are infringed or invalidated by the use of a screw anchor in conjunction with a metal bracket to underpin a

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foundation. Additional information [*1274] concerning the claims and the other aspects of this case appear in this court's opinion in *Ruiz v. A.B. Chance Co.*, 234 F.3d 654 (Fed. Cir. 2000). Examination of the prior art shows that the Fuller-Rupiper method discloses the screw anchor component of the claims; the Gregory system discloses the metal bracket component in the claims. Thus, this appeal is properly focused on the motivation to combine those teachings, as well as any secondary considerations that might inform the obviousness analysis.

The district court granted summary judgment in favor of Chance on all of Ruiz's non-patent claims in April 1999. On the patent claims, the district [**5] court held a Markman hearing to construe the claims and a bench trial to decide the issues of infringement and validity. At the time of trial, the scope of the case had narrowed to focus on claims 1-4 and 6-8 of the '368 patent and claims 1-4 and 6-8 of the '107 patent. After the trial, the district court entered its judgment from the bench that Ruiz's product infringes the patent claims to the tune of \$ 540,000 in damages. Nonetheless, the trial court determined that the claims are invalid under 35 U.S.C. § 103 in light of the Gregory patents and the Fuller-Rupiper method.

This court heard the appeal from that judgment and affirmed every holding of the district court except the finding of obviousness. In *Ruiz*, 234 F.3d at 660, this court remanded the case to the district court for further examination of obviousness. This court issued the following instructions:

On remand, we instruct the district court to make specific Graham findings on: 1) the reason, suggestion, or motivation present in the prior art, in the knowledge of one of skill in the art, or in the problem of foundation settling which clearly and particularly would [**6] lead one of ordinary skill in the art to combine screw anchors with metal brackets; 2) the level of ordinary skill in the art; and 3) whether, and to what extent, evidence of secondary consideration, such as commercial success, long felt but unresolved need, failure of others, copying, and unexpected results, is probative in the obviousness analysis.

Id.

The district court invited additional briefing and oral argument on the remand issues. Having reconsidered the evidence of the case, the district court again found the relevant claims invalid as obvious and issued an opinion outlining its factual findings according to this court's instructions. Of particular significance, the district court found the motivation to combine the teachings of the Gregory patents and the Fuller-Rupiper method in the nature of the problem of underpinning foundations itself, explaining:

The Rupiper method and the Gregory patent can be combined in either of two ways to reach the same result as the method covered by the patents in issue here: by replacing the concrete haunch of the Rupiper method with the bracket of the Gregory patent, or by replacing the straight piling of the [**7] Gregory patent with the screw anchor of the Rupiper method. The evidence in this case showed that there was reason, suggestion or motivation to make these combinations. . . . The problem is the same: how to underpin an unstable foundation of an existing building.

The district court also discounted Chance's proffered objective evidence of commercial success and skepticism of experts as weak. Specifically, the district court found that the alleged skepticism of Chance's system by Rupiper was merely an acknowledgement that Rupiper's concrete haunch worked better than a metal bracket in seismic areas, such as California. [*1275] The record indeed does not show that Rupiper doubted that Chance's system would work in general. In addition, the district court attributed Chance's commercial success to its background and experience in screw anchors rather than any inventive features of the screw anchor-metal bracket system as a whole.

Chance now appeals again, arguing that the district court, as it did in its original judgment, employed hindsight to find obviousness. Specifically, this appeal involves two challenges to the district court's obviousness determination: 1) whether the district [**8] court clearly erred in finding an implied motivation to combine the prior art teachings in the nature of the problem of underpinning existing foundations, and 2) whether the district court clearly erred in discounting Chance's evidence of secondary considerations. Jurisdiction over this appeal is proper under 28 U.S.C. § 1295.

II.

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Section 103 of title 35 of the United States Code states:

[HN1]

A patent may not be obtained . . . if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

35 U.S.C. § 103(a)(2000).

[HN2] In making the assessment of differences, *section 103* specifically requires consideration of the claimed invention "as a whole." Inventions typically are new combinations of existing principles or features. *Env'tl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 698 (Fed. Cir. 1983) (noting that "virtually all [inventions] are combinations of old elements."). The "as a whole" instruction [**9] in title 35 prevents evaluation of the invention part by part. Without this important requirement, an obviousness assessment might break an invention into its component parts (A + B + C), then find a prior art reference containing A, another containing B, and another containing C, and on that basis alone declare the invention obvious. This form of hindsight reasoning, using the invention as a roadmap to find its prior art components, would discount the value of combining various existing features or principles in a new way to achieve a new result - often the very definition of invention.

Section 103 precludes this hindsight discounting of the value of new combinations by requiring assessment of the invention as a whole. This court has provided [HN3] further assurance of an "as a whole" assessment of the invention under § 103 by requiring a showing that an artisan of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would select the various elements from the prior art and combine them in the claimed manner. In other words, the examiner or court must show some suggestion or motivation, before [**10] the invention itself, to make the new combination. See *In re Rouffet*, 149 F.3d 1350, 1355- 56 (Fed. Cir. 1998).

[HN4] While the ultimate determination of obviousness is a legal conclusion reviewed by this court without deference, that determination always entails various factual findings that this court reviews for clear error following a bench trial. See *Weatherchem Corp. v. J.L. Clark, Inc.*, 163 F.3d 1326, 1332 (Fed. Cir. 1998).

The clear error standard permits reversal only when this court is left with a "definite and firm conviction" that the district court was in error. *Amhil Enters. Ltd. v. Wawa, Inc.*, 81 F.3d 1554, 1562 (Fed. Cir. 1996).

[*1276] This case deals with a challenge to the district court's conclusion on two of the underlying factual determinations in its obviousness analysis. Accordingly, this court will review for clear error the district court's conclusions regarding objective, secondary considerations, see *Pro-Mold v. Great Lakes Plastics*, 75 F.3d 1568, 1572 (Fed. Cir. 1996), and whether a motivation to combine the teachings in the prior art references was shown, see *Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 1348 (Fed. Cir. 2000).
[**11]

The district court in this case presided over a bench trial and reconsidered the evidence on remand. Chance's principal argument is that the district court clearly erred in finding a motivation to combine the teachings in the Gregory patents with the Fuller- Rupiper method. Chance cites this court's precedent that warns district courts about the risk of hindsight reconstruction to find an invention obvious where the invention at issue involves relatively simple technology. See *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351 (Fed. Cir. 2001). Accordingly, Chance argues that the district court utilized hindsight to find that a person of ordinary skill would have been motivated to combine the prior art teachings.

To the contrary, the record in this case supports the trial court's findings. While this court indeed warns against employing hindsight, its counsel is just that - a warning. That warning does not provide a rule of law that an express, written motivation to combine must appear in prior art references before a finding of obviousness. Stated differently, this court has consistently stated that [HN5] a court or examiner may find a motivation to combine prior [**12] art references in the nature of the problem to be solved. See *Pro-Mold*, 75 F.3d at 1573; *Display Techs., Inc. v. Paul Flum Ideas, Inc.*, 282 F.3d 1340, 1346-47, 60 Fed. Appx. 787 (Fed. Cir. 2002); *In re Huang*, 100 F.3d 135, 139 n.5 (Fed. Cir. 1996). This form of motivation to combine evidence is particularly relevant with simpler mechanical technologies.

This record shows that the district court did not use hindsight in its obviousness analysis, but properly found a motivation to combine because the two references address precisely the same problem of underpinning existing structural foundations. Moreover the record supports the district court's factual finding that Fuller's and Rupiper's work showed that screw anchors worked better than straight push piers. In fact, the evidence

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shows that Rupiper introduced Chance to the use of screw anchors in underpinning building foundations. Chance then added a metal bracket to the screw anchor.

The record also supports the district court's conclusion that artisans knew that a foundation underpinning system requires a means of connecting the foundation to the load-bearing member. The Gregory patents teach the [**13] use of a metal bracket to connect a foundation to a straight pier, and testimony at trial showed that the need for a connecting element was widely known. Thus, the district court could properly conclude on this record, without being clearly in error, that a person of ordinary skill would be led to combine the screw anchor in the Fuller-Rupiper method with the metal bracket in the Gregory system to underpin an existing building foundation.

This record, it is true, does not feature an express written teaching in the art to make this combination. On this record, however, that is not fatal to the district court's obviousness determination. As noted earlier, this court has repeatedly stated that the motivation to combine the teachings in the prior art may "come from [*1277] the nature of a problem to be solved, leading inventors to look to references relating to possible solutions to that problem." *Pro-Mold*, 75 F.3d at 1573. The district court in this case applied that settled law. The district court, sitting as a finder of fact, weighed the evidence and found that, because the prior art references address the narrow problem of underpinning existing building foundations, a person [**14] seeking to solve that exact same problem would consult the references and apply their teachings together. Thus the district court's conclusion is perfectly legitimate when the evidence supports it, as it does here.

Chance's argument amounts to little more than its own alternative view of the evidence. While the record does contain some evidence against the district court's finding, such evidence is not overwhelming by any means. In addition, the district court in this case did not simply discount all contrary evidence and bolster a meager amount of evidence to reach a preformed

conclusion. In fact, the district court discounted and discredited some testimony that actually supported its ultimate conclusion. For instance, the trial court dismissed the testimony of Robert Jones, a Chance distributor, that he would have made the combination. The district court declined to credit Mr. Jones' testimony because he exhibited far more than an ordinary level of skill in this art. The trial court's careful consideration of Mr. Jones' evidence shows further that it performed a detailed and reasoned analysis of the evidence, rather than a conclusion-oriented discussion that typically accompanies [**15] a hindsight analysis. In short, the record in this case does not approach the evidence necessary to leave this court with a firm conviction that the district court committed clear error in its factual finding of a motivation to combine the Fuller-Rupiper and Gregory teachings.

Finally, the record also supports the district court's discounting of Chance's evidence of secondary considerations. The record supports the trial court's finding that any commercial success was not due to Chance's alleged unique combination, but rather due to Chance's experience with screw anchors combined with being the first large screw anchor manufacturer to enter the underpinning market. The district court did not clearly err in reaching this conclusion, nor in concluding that the evidence of skepticism was weak.

III.

Based on the above analysis, this court holds that the district court did not clearly err in finding a motivation to combine the prior art references in the nature of the problem at issue. In addition, this court holds that the district court did not clearly err in discounting Chance's evidence of secondary considerations. Accordingly, this court affirms the judgment of the district court. [**16]

COSTS

Each party shall bear its own costs.

AFFIRMED

LEXSEE 175 F.3D 994

IN RE ANITA DEMBICZAK and BENSON ZINBARG, Appellants.

98-1498

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

175 F.3d 994; 1999 U.S. App. LEXIS 8109; 50 U.S.P.Q.2D (BNA) 1614

April 28, 1999, Decided

PRIOR HISTORY: [**1]Appealed from: Patent and Trademark Office Board of Patent Appeals and Interferences. (Serial No. 08/427,732).

DISPOSITION: REVERSED.

LexisNexis (TM) HEADNOTES - Core Concepts:

COUNSEL: David P. Gordon, of Stamford, Connecticut, argued for appellant. Of counsel was Thomas A. Gallagher, of Stamford, Connecticut.

John M. Whealan, Associate Solicitor, Office of the Solicitor, of Arlington, Virginia, argued for appellee. With him on the brief were Albin F. Drost, Acting Solicitor, and David R. Nicholson, Associate Solicitor.

JUDGES: Before MAYER, Chief Judge, MICHEL and CLEVENGER, Circuit Judges.

OPINIONBY: CLEVENGER

OPINION: [*996] CLEVENGER, Circuit Judge.

Anita Dembiczak and Benson Zinbarg appeal the rejection, upheld by the Board of Patent Appeals and Interferences, of all pending claims in their Application No. 08/427,732. See *Ex Parte Dembiczak*, No. 96-2648, slip op. at 43 (May 14, 1998). Because the Board erred in sustaining rejections of the pending claims as obvious under 35 U.S.C. § 103(a) (Supp. 1998), and for obviousness-type double patenting, we reverse.

I

The invention at issue in this case is, generally speaking, a large trash bag made of orange plastic and decorated with lines and facial features, allowing the

bag, when filled [**2] with trash or leaves, to resemble a Halloween-style pumpkin, or jack-o'-lantern. As the inventors, Anita Dembiczak and Benson Zinbarg (collectively, "Dembiczak") note, the invention solves the long-standing problem of unsightly trash bags placed on the curbs of America, and, by fortuitous happenstance, allows users to express their whimsical or festive nature while properly storing garbage, leaves, or other household debris awaiting collection. Embodiments of the invention--sold under a variety of names, including Giant Stuff-A-Pumpkin TM, Funkins, Jack Sak TM, and Bag-O-Fun TM--have undisputedly been well-received by consumers, who bought more than seven million units in 1990 alone. Indeed, in 1990, the popularity of the pumpkin bags engendered a rash of thefts around Houston, Texas, leading some owners to resort to preventative measures, such as greasing the bags with petroleum jelly and tying them to trees. See R. Piller, "Halloween Hopes Die on the Vine," Hous. Chron., Oct. 19, 1990, at 13A.

The road to profits has proved much easier than the path to patentability, however. In July 1989, Dembiczak filed a utility patent application generally directed to the pumpkin bags. [**3] In a February 1992 appeal, the Board of Patent Appeals and Interferences ("the Board") reversed the Examiner's rejection, but entered new grounds for rejection. Dembiczak elected to continue prosecution, filing a continuation application to address the new grounds for rejection. Thereafter, the invention made a second appearance before the Board, in April 1993, when the Board both sustained the Examiner's rejection and again entered new grounds for rejection. Again, a continuation application was filed (the instant application). And again the Examiner's rejection was appealed to the Board, which sustained the rejection in a May 14, 1998, decision. See *Dembiczak*, slip op. at 43.

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A

The patent application at issue includes claims directed to various embodiments of [*997] the pumpkin bag. Claims 37, 49, 51, 52, 58 through 64, 66 through 69, and 72 through 81 are at issue in this appeal. Though the claims vary, independent claim 74 is perhaps most representative:

74. A decorative bag for use by a user with trash filling material, the bag simulating the general outer appearance of an outer surface of a pumpkin having facial indicia thereon, comprising:

a flexible waterproof plastic [**4] trash or leaf bag having

an outer surface which is premanufactured orange in color for the user to simulate the general appearance of the outer skin of a pumpkin, and having

facial indicia including at least two of an eye, a nose and a mouth on the orange color outer surface for forming a face pattern on said orange color outer surface to simulate the general outer appearance of a decorative pumpkin with a face thereon,

said trash or leaf bag having first and second opposite ends, at least said second end having an opening extending substantially across the full width of said trash or leaf bag for receiving the trash filling material,

wherein when said trash or leaf bag is filled with trash filling material and closed, said trash or leaf bag takes the form and general appearance of a pumpkin with a face thereon.

All of the independent claims on appeal, namely 37, 52, 72, and 74, contain limitations that the bag must be "premanufactured orange in color," have "facial indicia," have openings suitable for filling with trash material, and that when filled, the bag must have a generally rounded appearance, like a pumpkin. Independent claims 37, 52, and 72 add the [**5] limitation that the bag's height must at least 36 inches. Claim 72 requires that the bag be made of a "weatherproof material," and claim 74, as shown above, requires that the bag be "waterproof." Claim 52 recites a "method of assembling" a bag with the general characteristics of apparatus claim 37.

B

The prior art cited by the Board includes:

- (1) pages 24-25 of a book entitled "A Handbook for Teachers of Elementary Art," by Holiday Art Activities ("Holiday"), describing how to teach children to make a "Crepe Paper Jack-O-Lantern" out of a strip of orange crepe paper, construction paper cut-outs in the shape of facial features, and "wadded newspapers" as filling;
- (2) page 73 of a book entitled "The Everything Book for Teachers of Young Children," by Martha Shapiro and Valerie Indenbaum ("Shapiro"), describing a method of making a "paper bag pumpkin" by stuffing a bag with newspapers, painting it orange, and then painting on facial features with black paint;
- (3) U.S. Patent No. 3,349,991 to Leonard Kessler, entitled "Flexible Container" ("Kessler"), describing a bag apparatus wherein the bag closure is accomplished by the use of folds or gussets in the bag material;
- (4) [**6] U.S. Patent No. Des. 310,023, issued August 21, 1990 to Dembiczak ("Dembiczak '023"), a design patent depicting a bag with a jack-o'-lantern face;
- (5) U.S. Patent No. Des. 317,254, issued June 4, 1991 to Dembiczak ("Dembiczak '254"), a design patent depicting a bag with a jack-o'-lantern face; and,
- (6) Prior art "conventional" plastic lawn or trash bags ("the conventional trash bags").

Using this art, the Board affirmed the Examiner's final rejection of all the independent claims (37, 52, 72, 74) under 35 U.S.C. § 103, [*998] holding that they would have been obvious in light of the conventional trash bags in view of the Holiday and Shapiro references. The Board determined that, in its view of the prior art, "the only difference between the invention presently defined in the independent claims on appeal and the orange plastic trash bags of the prior art and the use of such bags resides in the application of the facial indicia to the outer

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surface of the bag." Dembiczak, slip op. at 18. The Board further held that the missing facial indicia elements were provided by the Holiday and Shapiro references' description of painting jack-o'-lantern faces on paper bags. See [**7] id. at 18-19. Dependent claims 49 and 79, which include a "gussets" limitation, were considered obvious under similar reasoning, except that the references cited against them included Kessler. See id. at 7.

The Board also affirmed the Examiner's obviousness-type double patenting rejection of all the independent claims in light of the two Dembiczak design patents ('023 and '254) and Holiday. See id. at 12. The Board held that the design patents depict a generally rounded bag with jack-o'-lantern facial indicia, and that the Holiday reference supplies the missing limitations, such as the "thin, flexible material" of manufacture, the orange color, the initially-open upper end, and the trash filling material. The Board also stated that the various limitations of the dependent claims--e.g., color, the inclusion of leaves as stuffing, and the dimensions--would all be obvious variations of the depictions in the Dembiczak design patents. See id. at 8-9. In addition, using a two-way test for obviousness-type double patenting, the Board held that the claims of the Dembiczak design patents "do not exclude" the additional structural limitations of the pending utility claims, [**8] and thus the design patents were merely obvious variations of the subject matter disclosed in the utility claims. See id. at 11. The Board further upheld, on similar grounds and with the inclusion of the Kessler reference, the obviousness-type double patenting rejection of dependent claim 49. See id. at 12.

This appeal followed, vesting this court with jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A) (1994).

II

A claimed invention is unpatentable if the differences between it and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. § 103(a) (Supp. 1998); see *Graham v. John Deere Co.*, 383 U.S. 1, 14, 148 U.S.P.Q. (BNA) 459, 465, 15 L.Ed. 2d 545, 86 S.Ct. 684 (1966). The ultimate determination of whether an invention is or is not obvious is a legal conclusion based on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness. See *Graham*, 383 U.S. at 17-18, 148 U.S.P.Q. (BNA) [**9] at 467; *Miles Labs, Inc., Inc. v. Shandon Inc.*, 997 F.2d 870, 877, 27 U.S.P.Q.2D (BNA)

1123, 1128 (Fed. Cir. 1993). We therefore review the ultimate determination of obviousness without deference to the Board, while examining any factual findings for clear error. See, e.g., *In re Zurko*, 142 F.3d 1447, 1459, 46 U.S.P.Q.2D (BNA) 1691, 1700 (Fed. Cir.) (en banc), cert. granted, 119 S.Ct. 401 (1998).

A

Our analysis begins in the text of section 103 quoted above, with the phrase "at the time the invention was made." For it is this phrase that guards against entry into the "tempting but forbidden zone of hindsight," see *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 873, 228 U.S.P.Q. (BNA) 90, 98 (Fed. Cir. 1985), overruled on other grounds by *Nobelpharma AB v. Implant Innovations, Inc.*, 141 F.3d 1059, 46 U.S.P.Q.2D (BNA) 1097 [*999] (Fed. Cir. 1998), when analyzing the patentability of claims pursuant to that section. Measuring a claimed invention against the standard established by section 103 requires the oft-difficult but critical step of casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted [**10] wisdom in the field. See, e.g., *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 U.S.P.Q. (BNA) 303, 313 (Fed. Cir. 1983). Close adherence to this methodology is especially important in the case of less technologically complex inventions, where the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." Id.

Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references. See, e.g., *C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340, 1352, 48 U.S.P.Q.2D (BNA) 1225, 1232 (Fed. Cir. 1998) (describing "teaching or suggestion or motivation [to combine]" as an "essential evidentiary component of an obviousness holding"); *In re Rouffet*, 149 F.3d 1350, 1359, 47 U.S.P.Q.2D (BNA) 1453, 1459 (Fed. Cir. 1998) ("the Board must identify specifically . . . the reasons one of ordinary skill in the art would have been motivated to select [**11] the references and combine them"); *In re Fritch*, 972 F.2d 1260, 1265, 23 U.S.P.Q.2D (BNA) 1780, 1783 (Fed. Cir. 1992) (examiner can satisfy burden of obviousness in light of combination "only by showing some objective teaching [leading to the combination]"); *In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q.2D (BNA) 1596, 1600 (Fed. Cir. 1988) (evidence of teaching or suggestion "essential" to avoid hindsight); *Ashland Oil, Inc. v. Delta Resins &*

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Refractories, Inc., 776 F.2d 281, 297, 227 U.S.P.Q. (BNA) 657, 667 (Fed. Cir. 1985) (district court's conclusion of obviousness was error when it "did not elucidate any factual teachings, suggestions or incentives from this prior art that showed the propriety of combination"). See also *Graham*, 383 U.S. at 18, 148 U.S.P.Q. (BNA) at 467 ("strict observance" of factual predicates to obviousness conclusion required). Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability--the essence of hindsight. See, e.g., *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1138, 227 U.S.P.Q. (BNA) 543, 547 (Fed. Cir. 1985) ("The invention [**12] must be viewed not with the blueprint drawn by the inventor, but in the state of the art that existed at the time."). In this case, the Board fell into the hindsight trap.

We have noted that evidence of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved, see *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573, 37 U.S.P.Q.2D (BNA) 1626, 1630 (Fed. Cir. 1996), *Para-Ordnance Mfg. v. SGS Imports Intern., Inc.*, 73 F.3d 1085, 1088, 37 U.S.P.Q.2D (BNA) 1237, 1240 (Fed. Cir. 1995), although "the suggestion more often comes from the teachings of the pertinent references," *Rouffet*, 149 F.3d at 1355, 47 U.S.P.Q.2D (BNA) at 1456. The range of sources available, however, does not diminish the requirement for actual evidence. That is, the showing must be clear and particular. See, e.g., *C.R. Bard*, 157 F.3d 1340 at 1352, 48 U.S.P.Q.2D (BNA) at 1232. Broad conclusory statements regarding the teaching of multiple references, standing alone, are not "evidence." E.g., *McElmurry v. Arkansas Power & Light Co.*, 995 F.2d 1576, 1578, 27 U.S.P.Q.2D (BNA) [**13] 1129, 1131 (Fed. Cir. 1993) ("Mere denials and conclusory statements, however, are not sufficient to establish a genuine issue of [*1000] material fact."); *In re Sichert*, 566 F.2d 1154, 1164, 196 U.S.P.Q. (BNA) 209, 217 (CCPA 1977) ("The examiner's conclusory statement that the specification does not teach the best mode of using the invention is unaccompanied by evidence or reasoning and is entirely inadequate to support the rejection."). In addition to demonstrating the propriety of an obviousness analysis, particular factual findings regarding the suggestion, teaching, or motivation to combine serve a number of important purposes, including: (1) clear explication of the position adopted by the Examiner and the Board; (2) identification of the factual disputes, if any, between the applicant and the Board; and (3) facilitation of review on appeal. Here, however, the Board did not make particular findings

regarding the locus of the suggestion, teaching, or motivation to combine the prior art references.

All the obviousness rejections affirmed by the Board resulted from a combination of prior art references, e.g., the conventional trash or yard bags, and the Holiday and Shapiro publications teaching [**14] the construction of decorated paper bags. See Dembicza, slip op. at 6-7. To justify this combination, the Board simply stated that "the Holiday and Shapiro references would have suggested the application of . . . facial indicia to the prior art plastic trash bags." Id. at 18-19. However, rather than pointing to specific information in Holiday or Shapiro that suggest the combination with the conventional bags, the Board instead described in detail the similarities between the Holiday and Shapiro references and the claimed invention, noting that one reference or the other-in combination with each other and the conventional trash bags--described all of the limitations of the pending claims. See id. at 18-28. Nowhere does the Board particularly identify any suggestion, teaching, or motivation to combine the children's art references (Holiday and Shapiro) with the conventional trash or lawn bag references, nor does the Board make specific--or even inferential--findings concerning the identification of the relevant art, the level of ordinary skill in the art, the nature of the problem to be solved, or any other factual findings that might serve to support a proper obviousness [**15] analysis. See, e.g., *Pro-Mold & Tool*, 75 F.3d at 1573, 37 U.S.P.Q.2D (BNA) at 1630.

To the contrary, the obviousness analysis in the Board's decision is limited to a discussion of the ways that the multiple prior art references can be combined to read on the claimed invention. For example, the Board finds that the Holiday bag reference depicts a "premanufactured orange" bag material, see Dembicza, slip op. at 21, finds that Shapiro teaches the use of paper bags in various sizes, including "large", see id. at 22-23, and concludes that the substitution of orange plastic for the crepe paper of Holiday and the paper bags of Shapiro would be an obvious design choice, see id. at 24. Yet this reference-by-reference, limitation-by-limitation analysis fails to demonstrate how the Holiday and Shapiro references teach or suggest their combination with the conventional trash or lawn bags to yield the claimed invention. See *Rouffet*, 149 F.3d at 1357, 47 U.S.P.Q.2D (BNA) at 1459 (noting Board's failure to explain, when analyzing the prior art, "what specific understanding or technical principle . . . would have suggested the combination"). Because we do not discern any finding by [**16] the Board that there was a suggestion, teaching, or motivation to combine the prior art references cited against the pending claims, the Board's conclusion of obviousness, as a matter of law, cannot stand. See *C.R. Bard*, 157 F.3d at 1352, 48 U.S.P.Q.2D (BNA) at 1232;

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Rouffet, 149 F.3d at 1359, 47 U.S.P.Q.2D (BNA) at 1459; *Fritch*, 972 F.2d at 1265, 23 U.S.P.Q.2D (BNA) at 1783; *Fine*, 837 F.2d at 1075, 5 U.S.P.Q.2D (BNA) at 1600; *Ashland Oil*, 776 F.2d at 297, 227 U.S.P.Q. (BNA) at 667.

B

The Commissioner of Patents and Trademarks ("Commissioner") attempts to justify the Board's decision on grounds [*1001] different from that relied upon by the Board, arguing that one of ordinary skill in the art would have been motivated to combine the references. Of course, in order to do so, the Commissioner must do what the Board did not do below: make specific findings of fact regarding the level of skill in the art ("a designer and manufacturer of trash and leaf bags, particularly one specializing in the ornamental and graphic design of such bags"), Resp't Br. at 14, the relationship between the fields of conventional trash bags and children's crafts, respectively ("the artisan would also have been well aware of the ancillary, [*17] corollary, and atypical uses of 'trash' bags such as their application in hobby and art projects"), Resp't Br. at 15, and the particular features of the prior art references that would motivate one of ordinary skill in a particular art to select elements disclosed in references from a wholly different field ("a designer and manufacturer of trash and leaf bags would have recognized the paper bag in Shapiro to be a trash bag and therefore would have been motivated to combine it with the admitted prior art plastic trash and leaf bags to arrive at the claimed invention"), Resp't Br. at 15. The Commissioner also appears to cite additional references in support of his obviousness analysis, noting that at least two design patents (in the record but not cited against the presently pending claims) teach the placement of "graphical information, including text, designs, and even facial indicia, to colored bags." Resp't Br. at 16. This new analysis, apparently cut from whole cloth in view of appeal, does little more than highlight the shortcomings of the decision below, and we decline to consider it. See, e.g., *In re Robertson*, 1999 U.S. App. LEXIS 3224, 169 F.3d 743, 746, [*18] 49 U.S.P.Q.2D (BNA) 1949, 1951 (Fed. Cir. 1999) ("We decline to consider [the Commissioner's] newly-minted theory as an alternative ground for upholding the agency's decision."); *In re Soni*, 54 F.3d 746, 751, 34 U.S.P.Q.2D (BNA) 1684, 1688 (Fed. Cir. 1995); *In re Hounsfield*, 699 F.2d 1320, 1324, 216 U.S.P.Q. (BNA) 1045, 1049 (Fed. Cir. 1983) (rejecting an "attempt[] by the Commissioner 'to apply a new rationale to support the rejection.'"); see also 35 U.S.C. § 144 (1994) (an appeal to the Federal Circuit "is taken on the record before The Patent and Trademark Office"). Because the Board has not established a prima facie case of obviousness, see *In re Bell*, 991 F.2d 781,

783, 26 U.S.P.Q.2D (BNA) 1529, 1531 (Fed. Cir. 1993) ("The PTO bears the burden of establishing a case of *prima facie obviousness*."), we therefore reverse the obviousness rejections, and have no need to address the parties' arguments with respect to secondary factors.

III

Dembiczak also asks this court to reverse the Board's rejection of the pending claims for obviousness-type double patenting, which is a judicially-created doctrine that seeks to prevent the applicant from expanding the grant of the patent right beyond the [*19] limits prescribed in Title 35. See, e.g., *In re Braat*, 937 F.2d 589, 592, 19 U.S.P.Q.2D (BNA) 1289, 1291-92 (Fed. Cir. 1991); *In re Longi*, 759 F.2d 887, 892, 225 U.S.P.Q. (BNA) 645, 648 (Fed. Cir. 1985). See also 35 U.S.C. § 154(a)(2) (Supp. 1998) (discussing patent term). The doctrine prohibits claims in a second patent which define "merely an obvious variation" of an invention claimed by the same inventor in an earlier patent. *Braat*, 937 F.2d at 592, 19 U.S.P.Q.2D (BNA) at 1292 (quoting *In re Vogel*, 57 C.C.P.A. 920, 422 F.2d 438, 441, 164 U.S.P.Q. (BNA) 619, 622 (CCPA 1970)). Thus, unless a claim sought in the later patent is patentably distinct from the claims in an earlier patent, the claim must be rejected. See *In re Goodman*, 11 F.3d 1046, 1052, 29 U.S.P.Q.2D (BNA) 2010, 2015 (Fed. Cir. 1993); *Vogel*, 422 F.2d at 441, 164 U.S.P.Q. (BNA) at 622. This question is one of law, which we review de novo. See *Goodman*, 11 F.3d at 1052, 29 U.S.P.Q.2D (BNA) at 2015; *Texas Instruments Inc. v. United States Int'l Trade Comm'n*, 988 F.2d 1165, 1179, 26 U.S.P.Q.2D (BNA) 1018, 1029 (Fed. Cir. 1993).

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The law provides that, in some very rare cases, obvious-type double patenting may be found between design and utility patents. [*20] See *Carman Indus., Inc. v. Wahl*, 724 F.2d 932, 939-40, 220 U.S.P.Q. (BNA) 481, 487 (Fed. Cir. 1983) (noting that, while theoretically possible, "double patenting is rare in the context of utility versus design patents"); *In re Thorington*, 57 C.C.P.A. 759, 418 F.2d 528, 536-37, 163 U.S.P.Q. (BNA) 644, 650 (CCPA 1969) (Double patenting between a design and utility patent is possible "if the features producing the novel aesthetic effect of a design patent or application are the same as those recited in the claims of a utility patent or application as producing a novel structure."); *In re Phelan*, 40 C.C.P.A. 1023, 205 F.2d 183, 98 U.S.P.Q. (BNA) 156 (CCPA 1953); *In re Barber*, 23 C.C.P.A. 834, 81 F.2d 231, 28 U.S.P.Q. (BNA) 187 (CCPA 1936); *In re Hargraves*, 19 C.C.P.A. 784, 53 F.2d 900, 11 U.S.P.Q. (BNA) 240 (CCPA 1931). In these cases, a "two-way" test is applicable. See *Carman*, 724 F.2d at 940, 220 U.S.P.Q.

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(BNA) at 487. Under this test, the obviousness-type double patenting rejection is appropriate only if the claims of the two patents cross-read, meaning that "the test is whether the subject matter of the claims of the patent sought to be invalidated would have been obvious from the subject matter of the claims of the [**21] other patent, and vice versa." *Id.*, 220 U.S.P.Q. (BNA) at 487. See also *Braat*, 937 F.2d at 593, 19 U.S.P.Q.2D (BNA) at 1292 (explaining two-way test).

B

In making its double patenting rejection, the Board concluded that all but one of the pending claims of Dembicczak's utility application would have been merely an obvious variation of the claims of the earlier-issued design patents--the Dembicczak '023 and '254 references--in light of the Holiday reference. The remaining claim, dependent claim 49, was judged obvious in light of the combination of the Dembicczak design patents, Holiday, and the Kessler reference.

Acknowledging that the two-way test was required by *Carman*, 724 F.2d at 940, 220 U.S.P.Q. (BNA) at 487, the Board concluded that "the design claimed in each of appellants' design patents does not exclude the features pertaining to the construction and color of the bag, the use of a plastic material for making the bag, the size or thickness of the bag . . . or the use of various types of filling material The particular details of the facial indicia would have been a matter of design choice as evidenced by the Holiday handbook," and that therefore, in view of Holiday, the claims of the [**22] design patents were obvious variants of the pending utility patent claims. See Dembicczak, slip op. at 11. We disagree. In order for a design to be unpatentable because of obviousness, there must first be a basic design reference in the prior art, the design characteristics of which are "basically the same as the claimed design." *In re Borden*, 90 F.3d 1570, 1574, 39 U.S.P.Q.2D (BNA) 1524, 1526 (Fed. Cir. 1996); *In re Rosen*, 673 F.2d 388, 391, 213 U.S.P.Q. (BNA) 347, 350 (CCPA 1982). The phrase "having facial indicia thereon" found in the claims of the pending utility application is not a design reference that is "basically the same as the claimed design." *Borden*, 90 F.3d at 1574, 39 U.S.P.Q.2D (BNA) at 1526. In fact, it describes precious little with respect to design characteristics. The Board's suggestion that the design details were simply "a matter of design choice" evinces a misapprehension of the subject matter of

design patents. E.g., *Carman*, 724 F.2d at 939 n.13, 220 U.S.P.Q. (BNA) at 486 n.13 ("Utility patents afford protection for the mechanical structure and function of an invention whereas design patent protection concerns the ornamental or aesthetic features of a design.") Indeed, we note [**23] that the two design patents at issue here--the Dembicczak '023 and '254 patents--were considered nonobvious over each other, and were even the subject of a restriction requirement. See 35 U.S.C. § 121 (1994) ("If two or more independent and distinct inventions are claimed in one [*1003] application, the Commissioner may require the application to be restricted to one of the inventions."); 37 C.F.R. § 1.142. The position adopted by the Board--that a textual description of facial indicia found in the claims of the utility patent application makes obvious the specific designs claimed in the (patentably distinct) Dembicczak design patents--would presumably render obvious, or even anticipate, all design patents where a face was depicted on a bag. But this, of course, is not the law; the textual description cannot be said to be a reference "basically the same as the claimed design," of the design patents at issue here. *Borden*, 90 F.3d at 1574, 39 U.S.P.Q.2D (BNA) at 1526 (internal quotation marks omitted). The Board's conclusion of obviousness is incorrect.

Because we find that the Board erred in concluding that the design patents were obvious variants of the pending utility claims, we need not address [**24] the other prong of the two-way double patenting test--whether the pending utility claims are obvious variations of the subject matter claimed in the design patents. See *Carman*, 724 F.2d at 939, 220 U.S.P.Q. (BNA) at 487 (both prongs of the two-way test required for obviousness-type double patenting). The double patenting rejections are reversed.

IV

Because there is no evidence in the record of a suggestion, teaching, or motivation to combine the prior art references asserted against the pending claims, the obviousness rejections are reversed. In addition, because the Board misapprehended the test for obviousness-type double patenting, and because the pending utility claims do not render obvious the design patents, the double patenting rejections are also reversed.

REVERSED

LIST OF REFERENCES

1	US 3,733,267
2	FR 2,268,898 (Abstract only)
3	US 4,685,930
4	US 4,747,960
5	US 5,057,240
6	US 6,368,359
7	US 4,309,247
8	US 3,441,501